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# TABLES FOR APPROXIMATING VOLUME GROWTH OF INDIVIDUAL TREES

by

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# TABLES FOR APPROXIMATING VOLUME GROWTH OF INDIVIDUAL TREES

By

P. D. Kemp and M. E. Metcalf
Division of Forest Economics

## Introduction

Foresters are frequently asked: How much has this tree grown in volume in the last 10 years, or, what is the current rate of volume growth? The answer to such questions usually requires rather complex computations. To simplify this task a set of volume growth tables 1/ has been prepared for the following species: ponderosa pine in western Montana, and western larch, western white pine, and ponderosa pine in North Idaho.

These growth tables were derived from average-height volume tables. Application of these tables requires only a diameter determination and a radial growth measurement either (1) number of annual rings in the outer radial inch, or (2) the number of years (rings) in a specified radial increment in inches. Field checks show that the growth of single trees can be determined from the tables within 15 percent of a precise determination two out of three times. The tables express volume growth in three ways:

1. Annual board-foot (Scribner) growth of trees by diameter class and radial increment.

2. Average annual board-foot (Scribner) growth percent of trees by diameter class and radial increment.

3. Periodic (10 years) board-foot (Scribner) growth of tress by diameter class and radial increment.

To facilitate the determination of growth of trees differing in diameter from the midpoint of the class and for growth rates between those indicated, the growth should be plotted over d.b.h. and curved in ordinary cross-section paper. This will not give a precise determination for the individual tree, of course, because it still does not take into account variations from average changes in height, form and bark thickness with changes in diameter. Nevertheless, the curved volumes and tables permit useful approximations of the volume growth of individual trees.

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1/ Copies of the 12 tables included in this paper are available in pocket size (5" x 7½") and may be obtained upon request.

Table 1. - Annual board-foot (Scribner) growth of trees by diameter class and radial increment

Ponderosa Pine - Western Montana

| D.B.H. (o.b.) | Average tree volume 1/ | Volume increase | Gross average annual growth by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches: | Board feet 2/ (Scribner) | | | | | | | | | | | | | | |
| 10 | 33 | | | | | | | | | | | | | | |
| 12 | 70 | 37 | 9 | 7 | 6 | 5 | 5 | 4 | 4 | 3 | 2 | 2 | 1 | 1 | 1 |
| 14 | 119 | 49 | 12 | 10 | 8 | 7 | 6 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 1 |
| 16 | 184 | 65 | 16 | 13 | 11 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 3 | 2 | 2 |
| 18 | 272 | 88 | 22 | 18 | 15 | 13 | 11 | 10 | 9 | 7 | 6 | 4 | 3 | 3 | 2 |
| 20 | 385 | 113 | 28 | 23 | 19 | 16 | 14 | 13 | 11 | 9 | 8 | 6 | 5 | 4 | 3 |
| 22 | 528 | 143 | 36 | 29 | 24 | 20 | 18 | 16 | 14 | 12 | 10 | 7 | 6 | 5 | 4 |
| 24 | 700 | 172 | 43 | 34 | 29 | 25 | 22 | 19 | 17 | 14 | 11 | 9 | 7 | 6 | 4 |
| 26 | 901 | 201 | 50 | 40 | 33 | 29 | 25 | 22 | 20 | 17 | 13 | 10 | 8 | 7 | 5 |
| 28 | 1,127 | 226 | 56 | 45 | 38 | 32 | 28 | 25 | 23 | 19 | 15 | 11 | 9 | 8 | 6 |
| 30 | 1,374 | 247 | 62 | 49 | 41 | 35 | 31 | 27 | 25 | 21 | 16 | 12 | 10 | 8 | 6 |
| 32 | 1,640 | 266 | 66 | 53 | 44 | 38 | 33 | 30 | 27 | 22 | 18 | 13 | 11 | 9 | 7 |
| 34 | 1,921 | 281 | 70 | 56 | 47 | 40 | 35 | 31 | 28 | 23 | 19 | 14 | 11 | 9 | 7 |
| 36 | 2,213 | 292 | 73 | 58 | 49 | 42 | 36 | 32 | 29 | 24 | 19 | 15 | 12 | 10 | 7 |
| 38 | 2,512 | 299 | 75 | 60 | 50 | 43 | 37 | 33 | 30 | 25 | 20 | 15 | 12 | 10 | 7 |
| 40 | 2,811 | 299 | 75 | 60 | 50 | 43 | 37 | 33 | 30 | 25 | 20 | 15 | 12 | 10 | 7 |
| Diameter increment per year (inches) | | | .50 | .40 | .33 | .29 | .25 | .22 | .20 | .17 | .13 | .10 | .08 | .07 | .05 |
| Years to attain next higher diameter class: | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |

1/ The average gross volume from curves based on cruise estimates for some 35,000 ponderosa pines in ponderosa pine stands of western Montana.

2/ The average annual growth in developing 1 inch in radial increment or 2 inches in diametral increment. Data are rounded to the nearest board foot.

Table 2. - Average annual board-foot (Scribner) growth percent 1/ of trees by diameter class and radial increment

Ponderosa Pine - Western Montana

| D.B.H. (o.b.) | Volume increase | Gross annual growth percent by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Percent | | | | | | | | | | | | | |
| 12 | 120 | 27 | 21 | 18 | 15 | 15 | 12 | 12 | 9 | 6 | 6 | 3 | 3 | 3 |
| 14 | 70 | 14 | 14 | 11 | 10 | 9 | 7 | 7 | 6 | 4 | 3 | 3 | 3 | 2 |
| 16 | 55 | 13 | 11 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 |
| 18 | 48 | 12 | 10 | 8 | 7 | 6 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 1 |
| 20 | 42 | 10 | 8 | 7 | 6 | 5 | 5 | 4 | 3 | 3 | 2 | 2 | 1 | 1 |
| 22 | 37 | 9 | 8 | 6 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 |
| 24 | 33 | 8 | 6 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| 26 | 29 | 7 | 6 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| 28 | 25 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| 30 | 22 | 6 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 32 | 19 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 34 | 17 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 36 | 15 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 38 | 14 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |
| 40 | 12 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ | 2/ |

1/ The simple growth percent, that is, the average annual board-foot growth during the period required for a 2-inch diameter increase divided by the volume at the beginning of the period. As indicated in table 1, the periods range from 4 to 40 years. All items are to the nearest whole number.

2/ Less than 1/2 of 1 percent. Items to the left of the heavy line are 1 percent or more.

Table 3. - Periodic (10 years) board-foot (Scribner) growth of trees by diameter class and radial increment

Ponderosa Pine - Western Montana

| D.B.H. (o.b.) | 16' logs per average tree | Gross 10-year growth 1/ by indicated 10-year radial increment in inches | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.50 | 2.00 | 1.67 | 1.43 | 1.25 | 1.11 | 1.00 | .83 | .67 | .50 | .40 | .33 | .25 |
| Inches | Number | Board feet (Scribner) | | | | | | | | | | | | |
| 12 | 1.5 | 70 | 65 | 57 | 50 | 44 | 40 | 37 | 31 | 26 | 20 | 16 | 13 | 10 |
| 14 | 2.5 | 101 | 86 | 75 | 66 | 59 | 53 | 49 | 41 | 34 | 26 | 21 | 17 | 13 |
| 16 | 2.2 | 131 | 111 | 99 | 87 | 78 | 71 | 65 | 55 | 45 | 35 | 28 | 23 | 18 |
| 18 | 2.7 | 179 | 153 | 133 | 118 | 105 | 96 | 88 | 74 | 61 | 47 | 38 | 31 | 24 |
| 20 | 3.0 | 236 | 201 | 174 | 154 | 136 | 123 | 113 | 95 | 79 | 60 | 48 | 40 | 30 |
| 22 | 3.3 | 303 | 256 | 220 | 195 | 173 | 156 | 143 | 120 | 98 | 75 | 60 | 49 | 38 |
| 24 | 3.8 | 375 | 315 | 269 | 237 | 209 | 189 | 172 | 144 | 118 | 90 | 72 | 59 | 45 |
| 26 | 4.2 | 448 | 373 | 318 | 278 | 246 | 221 | 201 | 168 | 137 | 104 | 83 | 69 | 52 |
| 28 | 4.5 | 517 | 427 | 362 | 315 | 278 | 249 | 226 | 189 | 153 | 116 | 93 | 77 | 58 |
| 30 | 4.7 | 577 | 473 | 399 | 347 | 305 | 273 | 247 | 206 | 167 | 126 | 101 | 83 | 63 |
| 32 | 5.0 | 629 | 513 | 432 | 374 | 329 | 294 | 266 | 222 | 180 | 135 | 108 | 89 | 67 |
| 34 | 5.2 | 673 | 547 | 459 | 397 | 348 | 311 | 281 | 234 | 189 | 142 | 114 | 94 | 71 |
| 36 | 5.3 | 708 | 573 | 480 | 414 | 363 | 323 | 292 | 243 | 196 | 147 | 118 | 97 | 73 |
| 38 | 5.3 | 733 | 591 | 494 | 425 | 373 | 332 | 299 | 248 | 201 | 150 | 120 | 99 | 75 |
| 40 | 5.2 | 745 | 598 | 498 | 428 | 374 | 332 | 299 | 248 | 200 | 149 | 119 | 98 | 74 |

1/ The growth in developing to the midpoint of the indicated diameter class. For example, an average tree now exactly 14 inches d.b.h. outside bark having a 10-year outer radial increment of 1.00 inch will have grown 49 board feet during that 10 years.

## Table 4. - Annual board-foot (Scribner) growth of trees by diameter class and radial increment

### Western Larch - North Idaho

| D.B.H. (o.b.) | Average tree volume 1/ | Volume increase | Gross average annual growth by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Board feet 2/ (Scribner) | | | | | | | | | | | | | | |
| 12 | 79 | | | | | | | | | | | | | | |
| 14 | 167 | 88 | 22 | 18 | 15 | 13 | 11 | 10 | 9 | 7 | 5 | 4 | 4 | 3 | 2 |
| 16 | 265 | 98 | 25 | 20 | 16 | 14 | 12 | 11 | 10 | 8 | 6 | 5 | 4 | 3 | 3 |
| 18 | 374 | 109 | 27 | 22 | 18 | 16 | 14 | 12 | 11 | 9 | 7 | 5 | 4 | 4 | 3 |
| 20 | 494 | 120 | 30 | 24 | 20 | 17 | 15 | 13 | 12 | 10 | 8 | 6 | 5 | 4 | 3 |
| 22 | 625 | 131 | 33 | 26 | 22 | 19 | 16 | 15 | 13 | 11 | 9 | 7 | 5 | 4 | 3 |
| 24 | 767 | 142 | 35 | 28 | 24 | 20 | 18 | 16 | 14 | 12 | 9 | 7 | 6 | 5 | 3 |
| 26 | 920 | 153 | 38 | 31 | 25 | 22 | 19 | 17 | 15 | 13 | 10 | 8 | 6 | 5 | 4 |
| 28 | 1,084 | 164 | 41 | 33 | 27 | 23 | 20 | 18 | 16 | 14 | 11 | 8 | 7 | 5 | 4 |
| 30 | 1,259 | 175 | 44 | 35 | 29 | 25 | 22 | 19 | 17 | 15 | 12 | 9 | 7 | 6 | 4 |
| 32 | 1,445 | 186 | 47 | 37 | 31 | 27 | 23 | 21 | 19 | 15 | 12 | 9 | 7 | 6 | 5 |
| 34 | 1,643 | 198 | 49 | 39 | 33 | 28 | 25 | 22 | 20 | 16 | 13 | 10 | 8 | 7 | 5 |
| 36 | 1,853 | 210 | 52 | 42 | 35 | 30 | 26 | 23 | 21 | 17 | 14 | 11 | 8 | 7 | 5 |
| 38 | 2,075 | 222 | 55 | 44 | 37 | 32 | 28 | 25 | 22 | 18 | 15 | 11 | 9 | 7 | 5 |
| 40 | 2,309 | 234 | 59 | 47 | 39 | 33 | 29 | 26 | 23 | 19 | 16 | 12 | 9 | 8 | 6 |
| Diameter increment per year (inches) | | | .50 | .40 | .33 | .29 | .25 | .22 | .20 | .17 | .13 | .10 | .08 | .07 | .05 |
| Years to attain next higher diameter class: | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |

1/ The average gross volume from curves based on cruise estimates for 1,957 western larch trees in western larch stands of North Idaho.

2/ The average annual growth in developing 1 inch in radial increment or 2 inches in diametral increment. Data are rounded to the nearest board foot.

Table 5. - Average annual board-foot (Scribner) growth percent 1/ of trees by diameter class and radial increment

Western Larch - North Idaho

| D.B.H. (o.b.) | Volume increase | Gross annual growth percent by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Percent | | | | | | | | | | | | | |
| 14 | 111 | 28 | 22 | 19 | 16 | 14 | 11 | 11 | 9 | 7 | 6 | 4 | 4 | 3 |
| 16 | 59 | 15 | 12 | 10 | 8 | 7 | 7 | 6 | 5 | 4 | 3 | 2 | 2 | 1 |
| 18 | 41 | 10 | 8 | 7 | 6 | 5 | 5 | 4 | 3 | 3 | 2 | 2 | 1 | 1 |
| 20 | 32 | 8 | 6 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| 22 | 27 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 |
| 24 | 23 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| 26 | 20 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2/ |
| 28 | 18 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 30 | 16 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 32 | 15 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |
| 34 | 14 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |
| 36 | 13 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |
| 38 | 12 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ | 2/ |
| 40 | 11 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ | 2/ |

1/ The simple growth percent, that is, the annual average board-foot growth during the period required for a 2-inch diameter increase divided by the volume at the beginning of the period. As indicated in table 1, the periods range from 4 to 40 years. All items are to the nearest whole number.

2/ Less than 1/2 of 1 percent. Items to the left of the heavy line are 1 percent or more.

Table 6. - Periodic (10 years) board-foot (Scribner) growth of trees by diameter class and radial increment

Western Larch - North Idaho

| D.B.H. (o.b.) | 16' logs per average tree | Gross 10-year growth 1/ by indicated 10-year radial increment in inches | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.50 | 2.00 | 1.67 | 1.43 | 1.25 | 1.11 | 1.00 | .83 | .67 | .50 | .40 | .33 | .25 |
| Inches | Number | Board feet (Scribner) | | | | | | | | | | | | |
| 14 | 3.74 | 164 | 144 | 127 | 115 | 104 | 95 | 88 | 73 | 59 | 44 | 33 | 29 | 22 |
| 16 | 4.42 | 217 | 186 | 157 | 136 | 120 | 108 | 98 | 81 | 66 | 49 | 39 | 32 | 25 |
| 18 | 4.92 | 251 | 207 | 175 | 151 | 134 | 120 | 109 | 90 | 73 | 54 | 44 | 36 | 27 |
| 20 | 5.38 | 278 | 229 | 193 | 167 | 147 | 132 | 120 | 100 | 80 | 60 | 48 | 40 | 30 |
| 22 | 5.75 | 305 | 251 | 211 | 183 | 161 | 144 | 131 | 109 | 88 | 65 | 52 | 43 | 33 |
| 24 | 5.97 | 333 | 273 | 230 | 198 | 175 | 156 | 142 | 118 | 95 | 71 | 57 | 47 | 36 |
| 26 | 6.13 | 360 | 295 | 248 | 214 | 188 | 169 | 153 | 127 | 103 | 77 | 62 | 51 | 39 |
| 28 | 6.21 | 388 | 317 | 267 | 230 | 202 | 181 | 164 | 136 | 110 | 82 | 66 | 54 | 41 |
| 30 | 6.26 | 415 | 339 | 285 | 246 | 216 | 193 | 175 | 145 | 117 | 87 | 70 | 58 | 44 |
| 32 | 6.28 | 443 | 361 | 303 | 261 | 230 | 205 | 186 | 154 | 125 | 93 | 75 | 61 | 47 |
| 34 | 6.32 | 471 | 384 | 323 | 278 | 245 | 218 | 198 | 164 | 133 | 99 | 79 | 65 | 50 |
| 36 | 6.37 | 501 | 408 | 343 | 295 | 259 | 232 | 210 | 174 | 141 | 105 | 84 | 69 | 53 |
| 38 | 6.36 | 531 | 432 | 363 | 312 | 275 | 245 | 222 | 184 | 149 | 111 | 89 | 73 | 56 |
| 40 | 6.53 | 561 | 456 | 383 | 329 | 289 | 259 | 234 | 194 | 157 | 117 | 94 | 77 | 59 |

1/ The growth in developing to the midpoint of the indicated diameter class. For example, an average tree now exactly 14 inches d.b.h. outside bark, having a 10-year outer radial increment of 1.00 inch will have grown 88 board feet during that 10 years.

## Table 7. - Annual board-foot (Scribner) growth of trees by diameter class and radial increment

### White Pine - North Idaho

| D.B.H. (o.b.) | Average tree volume 1/ | Volume increase | Gross average annual growth by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Board feet 2/ (Scribner) | | | | | | | | | | | | | | |
| 10 | 25 | | | | | | | | | | | | | | |
| 12 | 110 | 85 | 21 | 17 | 14 | 12 | 11 | 9 | 8 | 7 | 6 | 4 | 3 | 3 | 2 |
| 14 | 210 | 100 | 25 | 20 | 17 | 14 | 13 | 11 | 10 | 8 | 7 | 5 | 4 | 3 | 3 |
| 16 | 322 | 112 | 28 | 22 | 19 | 16 | 14 | 12 | 11 | 9 | 7 | 6 | 4 | 4 | 3 |
| 18 | 448 | 126 | 31 | 25 | 21 | 18 | 16 | 14 | 13 | 10 | 8 | 6 | 5 | 4 | 3 |
| 20 | 591 | 143 | 36 | 29 | 24 | 20 | 18 | 16 | 14 | 12 | 10 | 7 | 6 | 5 | 4 |
| 22 | 754 | 163 | 41 | 33 | 27 | 23 | 20 | 18 | 16 | 14 | 11 | 8 | 7 | 5 | 4 |
| 24 | 940 | 186 | 47 | 37 | 31 | 27 | 23 | 21 | 19 | 15 | 13 | 8 | 7 | 6 | 5 |
| 26 | 1,151 | 211 | 53 | 42 | 35 | 30 | 26 | 23 | 21 | 18 | 14 | 11 | 8 | 7 | 5 |
| 28 | 1,389 | 238 | 59 | 47 | 39 | 34 | 30 | 26 | 24 | 20 | 16 | 12 | 10 | 8 | 6 |
| 30 | 1,655 | 266 | 67 | 53 | 44 | 38 | 33 | 30 | 27 | 22 | 18 | 13 | 11 | 9 | 7 |
| 32 | 1,950 | 295 | 74 | 59 | 49 | 42 | 37 | 33 | 30 | 25 | 20 | 15 | 12 | 10 | 7 |
| 34 | 2,275 | 325 | 81 | 65 | 54 | 46 | 41 | 36 | 33 | 27 | 22 | 16 | 13 | 11 | 8 |
| 36 | 2,630 | 355 | 89 | 71 | 59 | 51 | 44 | 39 | 35 | 30 | 24 | 18 | 14 | 12 | 9 |
| 38 | 3,015 | 385 | 96 | 77 | 64 | 55 | 48 | 43 | 39 | 32 | 26 | 19 | 15 | 13 | 10 |
| 40 | 3,429 | 414 | 104 | 83 | 69 | 59 | 52 | 46 | 41 | 34 | 28 | 21 | 17 | 14 | 10 |
| Diameter increment per year (inches) | | | .50 | .40 | .33 | .29 | .25 | .22 | .20 | .17 | .13 | .10 | .08 | .07 | .05 |
| Years to attain next higher diameter class | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |

1/ The average gross volume from curves based on cruise estimates for 102,080 white pine trees in white pine stands of North Idaho.

2/ The average annual growth in developing 1 inch in radial increment or 2 inches in diametral increment. Data are rounded to the nearest board foot.

Table 8. - Average annual board-foot (Scribner) growth percent 1/ of trees by diameter class and radial increment

White Pine - North Idaho

| D.B.H. (o.b.) | Volume increase | Gross annual growth percent by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches: | - - -

Table 9. - Periodic (10 years) board-foot (Scribner) growth of trees by diameter class and radial increment

White Pine - North Idaho

| D.B.H. (o.b.) | 16' logs per average tree | Gross 10-year growth 1/ by indicated 10-year radial increment in inches | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.50 | 2.00 | 1.67 | 1.43 | 1.25 | 1.11 | 1.00 | .83 | .67 | .50 | .40 | .33 | .25 |
| Inches | Number | Board feet (Scribner) | | | | | | | | | | | | |
| 12 | 2.75 | 109 | 106 | 103 | 96 | 92 | 89 | 85 | 71 | 57 | 43 | 34 | 28 | 21 |
| 14 | 4.00 | 198 | 185 | 157 | 136 | 121 | 110 | 100 | 83 | 67 | 50 | 40 | 33 | 25 |
| 16 | 4.87 | 254 | 212 | 179 | 155 | 137 | 121 | 112 | 94 | 76 | 56 | 45 | 37 | 28 |
| 18 | 5.47 | 288 | 238 | 201 | 174 | 154 | 138 | 126 | 105 | 84 | 63 | 50 | 42 | 32 |
| 20 | 5.91 | 325 | 269 | 227 | 197 | 175 | 157 | 143 | 119 | 96 | 71 | 57 | 47 | 36 |
| 22 | 6.28 | 369 | 306 | 259 | 224 | 198 | 178 | 163 | 132 | 110 | 82 | 66 | 54 | 41 |
| 24 | 6.57 | 420 | 349 | 295 | 256 | 227 | 204 | 186 | 154 | 125 | 93 | 74 | 61 | 46 |
| 26 | 6.82 | 479 | 397 | 336 | 291 | 257 | 231 | 211 | 175 | 141 | 105 | 84 | 70 | 53 |
| 28 | 7.04 | 542 | 449 | 379 | 329 | 291 | 261 | 238 | 198 | 159 | 119 | 95 | 79 | 60 |
| 30 | 7.30 | 609 | 504 | 425 | 368 | 325 | 292 | 266 | 221 | 178 | 133 | 106 | 88 | 67 |
| 32 | 7.52 | 680 | 561 | 473 | 409 | 362 | 324 | 295 | 245 | 198 | 148 | 118 | 97 | 74 |
| 34 | 7.68 | 753 | 620 | 523 | 452 | 399 | 357 | 325 | 270 | 218 | 163 | 130 | 107 | 81 |
| 36 | 7.87 | 828 | 680 | 573 | 495 | 436 | 391 | 355 | 295 | 238 | 178 | 142 | 117 | 89 |
| 38 | 8.04 | 903 | 740 | 623 | 538 | 474 | 424 | 385 | 320 | 258 | 193 | 154 | 127 | 96 |
| 40 | 8.22 | 977 | 799 | 672 | 580 | 510 | 456 | 414 | 344 | 277 | 207 | 166 | 137 | 103 |

1/ The growth in developing to the midpoint of the indicated diameter class. For example, an average tree now exactly 14 inches d.b.h. outside bark, having a 10-year outer radial increment of 1.00 inch will have grown 100 board feet during that 10 years.

Table 10. - Annual board-foot (Scribner) growth of trees by diameter class and radial increment

Ponderosa Pine - North Idaho

| D.B.H. (o.b.) | Average tree volume 1/ | Volume increase | Gross average annual growth by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Board foot 2/ (Scribner) | | | | | | | | | | | | | | |
| 10 | 42 | | | | | | | | | | | | | | |
| 12 | 73 | 31 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| 14 | 123 | 50 | 13 | 10 | 8 | 7 | 6 | 6 | 5 | 4 | 3 | 3 | 2 | 2 | 2 |
| 16 | 199 | 76 | 19 | 15 | 13 | 11 | 10 | 8 | 8 | 6 | 5 | 4 | 3 | 3 | 2 |
| 18 | 301 | 102 | 26 | 20 | 17 | 15 | 13 | 11 | 10 | 8 | 7 | 5 | 4 | 4 | 3 |
| 20 | 429 | 128 | 32 | 26 | 21 | 18 | 16 | 14 | 13 | 11 | 9 | 6 | 5 | 4 | 3 |
| 22 | 582 | 153 | 38 | 31 | 26 | 22 | 19 | 17 | 15 | 13 | 10 | 8 | 6 | 5 | 4 |
| 24 | 760 | 178 | 45 | 30 | 30 | 25 | 22 | 20 | 18 | 15 | 11 | 9 | 7 | 6 | 5 |
| 26 | 962 | 202 | 51 | 40 | 34 | 29 | 25 | 22 | 20 | 17 | 13 | 10 | 8 | 7 | 5 |
| 28 | 1,188 | 226 | 57 | 45 | 38 | 32 | 28 | 25 | 23 | 19 | 15 | 11 | 9 | 8 | 6 |
| 30 | 1,437 | 249 | 62 | 50 | 42 | 36 | 31 | 28 | 25 | 21 | 17 | 12 | 10 | 8 | 6 |
| 32 | 1,707 | 270 | 67 | 54 | 45 | 39 | 34 | 30 | 27 | 22 | 18 | 14 | 11 | 9 | 7 |
| 34 | 1,998 | 291 | 73 | 58 | 49 | 42 | 36 | 32 | 29 | 24 | 19 | 15 | 12 | 10 | 7 |
| 36 | 2,309 | 311 | 78 | 62 | 52 | 44 | 39 | 35 | 31 | 26 | 21 | 16 | 12 | 10 | 8 |
| 38 | 2,639 | 330 | 83 | 66 | 55 | 47 | 41 | 37 | 33 | 27 | 22 | 17 | 13 | 11 | 8 |
| 40 | 2,987 | 348 | 87 | 70 | 58 | 50 | 43 | 39 | 35 | 29 | 23 | 17 | 14 | 12 | 9 |
| Diameter increment per year (inches) | | | .50 | .40 | .33 | .29 | .25 | .22 | .20 | .17 | .13 | .10 | .08 | .07 | .05 |
| Years to attain next higher diameter class | | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |

1/ The average gross volume from curves based on cruise estimates for 12,229 ponderosa pine trees in ponderosa pine stands of North Idaho.

2/ The average annual growth in developing 1 inch in radial increment or 2 inches in diametral increment. Data are rounded to the nearest board foot.

Table 11. - Average annual board-foot (Scribner) growth percent 1/ of trees by diameter class and radial increment

Ponderosa Pine - North Idaho

| D.B.H. (o.b.) | Volume increase | Gross annual growth percent by indicated rings in the outer radial inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 25 | 30 | 40 |
| Inches | Percent | | | | | | | | | | | | | |
| 12 | 74 | 18 | 15 | 12 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 2 |
| 14 | 68 | 17 | 14 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 3 | 3 | 2 | 2 |
| 16 | 62 | 15 | 12 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 2 | 2 |
| 18 | 51 | 13 | 10 | 9 | 7 | 6 | 6 | 5 | 4 | 3 | 3 | 2 | 2 | 1 |
| 20 | 43 | 11 | 9 | 7 | 6 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 1 |
| 22 | 36 | 9 | 7 | 6 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 1 |
| 24 | 31 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 |
| 26 | 27 | 7 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| 28 | 23 | 6 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| 30 | 21 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 32 | 19 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2/ |
| 34 | 17 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 36 | 16 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ |
| 38 | 14 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |
| 40 | 13 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2/ | 2/ |

1/ The simple growth percent, that is, the annual average board-foot growth during the period required for a 2-inch diameter increase divided by the volume at the beginning of the period. As indicated in table 1, the periods range from 4 to 40 years. All items are to the nearest whole number.

2/ Less than 1/2 of 1 percent. Items to the left of the heavy line are 1 percent or more.

Table 12. - Periodic (10 years) board-foot (Scribner) growth of trees by diameter class and radial increment

Ponderosa Pine - North Idaho

| D.B.H. (o.b.) | 16' logs per average tree | Gross 10-year growth 1/ by indicated 10-year radial increment in inches | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.50 | 2.00 | 1.67 | 1.43 | 1.25 | 1.11 | 1.00 | .83 | .67 | .50 | .40 | .33 | .25 |
| Inches | Number | Board feet (Scribner) | | | | | | | | | | | | |
| 12 | 1.57 | 72 | 62 | 53 | 46 | 40 | 35 | 31 | 25 | 20 | 15 | 12 | 10 | 8 |
| 14 | 2.66 | 98 | 81 | 71 | 63 | 58 | 53 | 50 | 42 | 34 | 25 | 20 | 17 | 13 |
| 16 | 2.99 | 131 | 126 | 110 | 97 | 89 | 81 | 76 | 64 | 51 | 38 | 30 | 25 | 19 |
| 18 | 3.64 | 203 | 178 | 153 | 135 | 121 | 110 | 102 | 85 | 69 | 51 | 41 | 34 | 26 |
| 20 | 4.10 | 268 | 230 | 196 | 172 | 153 | 139 | 128 | 106 | 86 | 64 | 51 | 42 | 32 |
| 22 | 4.29 | 332 | 281 | 239 | 208 | 185 | 167 | 153 | 127 | 103 | 77 | 61 | 50 | 38 |
| 24 | 4.55 | 395 | 331 | 281 | 244 | 216 | 195 | 178 | 148 | 119 | 89 | 71 | 58 | 44 |
| 26 | 4.85 | 456 | 380 | 321 | 279 | 247 | 222 | 202 | 168 | 135 | 101 | 81 | 67 | 50 |
| 28 | 5.17 | 517 | 428 | 361 | 313 | 277 | 248 | 226 | 188 | 151 | 113 | 90 | 75 | 56 |
| 30 | 5.31 | 576 | 475 | 400 | 346 | 306 | 274 | 249 | 207 | 167 | 125 | 99 | 82 | 62 |
| 32 | 5.37 | 632 | 519 | 437 | 377 | 332 | 297 | 270 | 225 | 181 | 136 | 108 | 89 | 68 |
| 34 | 5.46 | 686 | 561 | 472 | 407 | 358 | 320 | 291 | 242 | 195 | 146 | 116 | 96 | 73 |
| 36 | 5.45 | 737 | 602 | 506 | 436 | 384 | 343 | 311 | 258 | 208 | 156 | 124 | 103 | 78 |
| 38 | 5.39 | 787 | 641 | 538 | 464 | 408 | 364 | 330 | 274 | 221 | 165 | 132 | 109 | 83 |
| 40 | 5.38 | 833 | 678 | 569 | 490 | 431 | 384 | 348 | 289 | 233 | 174 | 139 | 115 | 87 |

1/ The growth in developing to the midpoint of the indicated diameter class. For example, an average tree now exactly 14 inches d.b.h. outside bark, having a 10-year outer radial increment of 1.00 inch will have grown 50 board feet during that 10 years.

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